Finding Space in Deterrence

Toward a General Framework for "Space Deterrence"

At the dawn of the nuclear age, deterrence came into its own. Deterrence had existed previously, of course, but the unprecedented destructive power of atomic weapons made the price of deterrence failure unaffordable. Scholars, particularly in the United States, spent careers studying and theorizing about various aspects of the superpowers' military balance—first-strike stability, escalation ladders, and conditions for deterrence failure. By the end of the Cold War, the United States had generally accepted a theory of deterrence that sought to ensure strategic stability by assuring, in the event of deterrence failure, the total annihilation of the opponent.

During this period, the safety of space systems was maintained by their close linkage to nuclear force structures. In peacetime, space systems provided reassurance that the other party was complying with nuclear arms-control treaties. During crisis and wartime, space systems could provide early warning of an attack, enable nuclear command and control authorities to dole out the appropriate level of retaliatory devastation, and conduct battle-damage assessment to confirm weapons detonated as planned. Given these roles, decision makers in Washington presumed that an attack on space assets would prefigure a nuclear confrontation. Thus, the problem of space deterrence independent of nuclear stability was uninteresting at best. This is no longer the case.

The *National Security Space Strategy* notes that space is increasingly congested, contested, and competitive.[1] Following China's 2007 debris-generating antisatellite test, which demonstrated that the contest was widening, Western scholars began to explore how to deter the use of such a capability during conflict. The starting point for this analysis, naturally, was the body of work developed to support nuclear stability. While the similarities provide a good foundation for developing a theory of space deterrence, a reluctance to scrutinize the differences will set the stage for deterrence failure.

Those differences can be examined, and the logic and grammar of space weapons can be distinguished from their strategic brethren. Such an examination highlights the limits of space deterrence while also providing

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critical insights to advance a strategist's thinking on the topic. This understanding will set the stage for an understanding of deterrence dynamics as they relate to space systems, and vice versa. Employing the traditional constituent elements of deterrence—impose cost, deny benefit, and encourage restraint—this commentary demonstrates how deterrence theory can enhance the space component of strategic stability.[2]

Deterrence in Space or Space in Deterrence

Any analysis must begin by acknowledging the differences in destructive power between nuclear and space weapons. As devastating as space weapons can be—and while debris from China's 2007 test will threaten space operations for hundreds of years— they do not threaten the extinction of mankind. This statement is simple in formulation, but the implications are far-reaching.

First, while it can be argued that nuclear forces had a dampening effect on some conventional conflicts in some parts of the world, the primary utility of nuclear weapons by the end of the Cold War was to deter the use of similar weapons by an adversary. The uses of nuclear weapons were at the top rungs of the escalation ladder, and once exchanged, the salience of weapons beneath this rung shrank. Nuclear deterrence in many respects defined the military competition, thus the significance of crisis, conflict, or the introduction of new weapons systems was measured in terms of how they affected nuclear stability.

Counterspace systems, on the other hand, are viewed as just another weapon rather than as weapons that represent the pinnacle of conflict or that define bilateral relationships. Perhaps as a result, counterspace weapons are proliferating in terms of their types, ownership, and employment; both state and nonstate actors have used them to advance their political goals.

Second, nuclear deterrence primarily operated on a symmetrical basis. In this delicate balance, there was symmetry in mutual dependence and vulnerability. There is no effective defense against a large-scale nuclear attack, and its destructive capacity intrinsically poses existential threats to nation-states (not to mention their populations). This is not true for space.

Space systems, like terrestrial targets of nuclear weapons, share a mutual vulnerability. The domain is said to be "offense dominant," in that holding space targets at risk is far easier and cheaper than defending them.

However, mutual dependence is absent. Although other states increasingly utilize space for economic and military purposes, the United States is by far the most reliant on space systems due to its global responsibilities and high-technology approach to warfare that heavily leverages space systems for communication, navigation, and intelligence, surveillance, and reconnaissance. This asymmetry creates an imbalance; the more a nation relies on space systems, the more tempted a potential adversary is to target those systems.

Third, deterrence in space is not binary. Although some theorists distinguished between tactical and strategic nuclear exchanges, most accepted the notion that once the nuclear threshold was crossed, the future of humanity was in doubt. Counterspace weapons and targets come in many different types, with differing implications for deterrence and escalation dynamics.[3] Reversible counterspace weapons that are difficult to attribute and have localized effects are more difficult to deter and are likely to be employed early in a conflict. Conversely, the use of debris-generating, kinetic weapons that destroy a space asset permanently (should) have a much higher threshold for use. Similarly, space systems also come in a variety of typologies, with concomitant effects for a deterrence theory. Disrupting the operations of a commercial communications satellite has different tactical, operational, and strategic implications than interfering with strategic early-warning satellites. As such, the threshold for deterrence in a space context varies based on both weapon and target, creating a situation where deterrence holds for some targets while simultaneously failing for others.

Given these critical differences, it becomes clear that "space deterrence" must operate on two levels. First, deterrence in space should be constructed to convince an adversary that it should not disrupt, deny, degrade, or destroy the space assets on which a nation relies. This is the most widely embraced formulation and the one which draws closest upon nuclear deterrence literature. However, since space deterrence is not binary, does not contain the requisite mutual dependence of nuclear stability, and does not operate exclusively at the highest levels of conflict, space stability must also be considered in the broader deterrence relationship between potential adversaries.

An adversary contemplating a terrestrial conflict will assess the overarching stability of the situation, including the relative balance of forces at different levels of conflict. Such an adversary may assess that the balance

of military power is against it and, therefore, decide not to undertake an action of aggression. However, if that same adversary foresees a chance to alter that balance by preemptively undercutting a critical source of the target's power—for example, by denying vital space or cyber capabilities—its conclusion may be different. As such, strategists must seek to ensure that deterrence is balanced across domains and elements of national power. The alternative is to risk that vulnerability in one narrow area, such as space, can collapse the threshold for deterrence failure more broadly. Simply put, strategic stability must be sought in space, and space stability must help maintain the overarching deterrence posture here on Earth.

Having acknowledged these differences, we now turn to construct an approach to space deterrence that deters attacks against space systems while bolstering the overarching deterrence posture. This approach—utilizing the familiar typology of impose cost, deny benefit, and encourage restraint—ensures that, should deterrence fail in space, national leaders have options and capabilities that allow them to prevail in the broader terrestrial conflict. This is imminently preferable to the options that would have been presented to leaders of the United States or the Soviet Union following the failure of nuclear deterrence.

Impose Cost

Deterrence by cost imposition involves a credible implicit or explicit threat of retaliation in response to an action by an adversary. The Cold War nuclear deterrence dynamic of mutual assured destruction is perhaps the best and most extreme example of deterrence by the threat of imposed costs. In the context of today's space domain, deterrence by cost imposition has three components: norms of behavior, the ability to attribute activity, and a credible ability to impose punishment using all elements of national power.

International norms of responsible behavior help condition potential adversaries about which actions are acceptable and which are not. Unacceptable actions risk generating proportional, though not necessarily symmetrical, responses that run from public rebuke through progressively more serious diplomatic, political, economic, and military actions. The particular response would depend largely on the terrestrial situation at the time. An understanding of what behavior is considered unacceptable and an appreciation of the potential consequences contribute to deterrence by complicating an adversary's decision-making calculus.

In addition to informing potential adversaries about activities that might prompt retaliation, norms of responsible behavior build international support for retaliatory responses. This enhances the credibility of the threat to impose costs because a potential adversary risks retaliation from an international coalition rather than just the victim. Iraq's invasion and annexation of Kuwait in the summer of 1990 is a good example. Since the aggression was a flagrant disregard of the established international order, the task of assembling an extensive coalition to liberate Kuwait and punish Iraq was comparatively easier. While reversing aggression in space is more difficult, the prospect of this dynamic bolsters space deterrence by improving the linkage between aggression and a credible response.

A critical aspect of credibility is the ability to attribute malicious activity in space. One must know that a satellite has been attacked or that a norm has been violated, whether deliberately or through gross negligence, and by whom. Attribution is particularly difficult in space because the space domain is an exceptionally harsh environment and on-orbit assets are operated from great distances. Nondestructive interference is often the result of natural phenomena (e.g., solar flares) or inadvertent interference (e.g., operator error or equipment malfunction). Even catastrophic losses can be accidental—in February 2009 an Iridium spacecraft was destroyed by a dead Russian satellite (*Cosmos 2251*). The ability to know who has taken what actions is critical to the retaliatory threat.

The final component of the cost imposition element is the credible ability to carry out retaliation. This includes all elements of national power in any domain. It need not, and should not, be limited to military actions in the space domain.

Deny Benefit

In a dynamic primarily defined by nuclear arms, the ability to impose cost was generally thought a sufficient deterrence strategy since there were no viable means of defending against, or mitigating the effects of, a nuclear conflagration. In other domains a more balanced approach is warranted. A space deterrence framework must include defensive or coping mechanisms which either raise the inherent costs of conducting the attack and/or minimize the benefit of the attack in the first place. Convincing an adversary that the contemplated aggression will not succeed or, if it does, the effect will not outweigh the costs of carrying out that action contributes to deterrence. This is particularly important when understanding space as

part of the larger balance of forces between countries. If space systems appear to be an Achilles' heel of conventional power projection, an adversary may attempt a knock-out blow before the terrestrial conflict becomes fully apparent. In this way, space vulnerability and dependence threaten to collapse the threshold for deterrence failure more broadly.

Enhancing resilience, augmentation, and the ability to operate in a degraded environment all contribute to both deterrence in space and to the space component of strategic stability. Resilient space systems and architectures can support their assigned missions despite an adversary's purposeful interference. Even in an era of fiscal austerity, resilience can be improved in a number of ways, such as disaggregating architectures into a larger number of smaller satellites or by utilizing hosted payloads.

Augmentation of national space systems through partnerships also provides an additional margin that makes it harder for a potential adversary to deprive forces of the space-derived capabilities that enable modern warfare. Such partnerships have the added benefit of complicating an adversary's decision making by introducing additional variables (influencing both the "impose costs" and "encourage restraint" dynamics). In addition to the space capabilities extant with current international partners, the commercial sector has capabilities—most notably, but not limited to, satellite communications—that could be used to augment national security capabilities. The Civil Reserve Air Fleet provides a model for using commercial capabilities in times of crisis that could be applied to space.

Regardless of the degree to which resilience can be improved and partners can contribute, some degree of degradation of the space environment is probable before and during a terrestrial conflict. US and coalition forces must be prepared to conduct successful air, land, sea, and cyber operations in this degraded space environment. Concepts of operation, tactics, techniques, and procedures, as well as redundant cross-domain capabilities, must be developed and exercised so our forces can succeed in their missions regardless of an adversary's counterspace campaign. Here again, if an adversary believes US and coalition forces will prevail in a conflict despite the effects of its counterspace campaign, then that adversary may never launch that campaign or even the broader military operation it is intended to support.

Encourage Restraint

The final element in any comprehensive deterrence strategy is encouraging restraint—convincing a potential adversary that not taking a particular action in a specific circumstance is a preferable alternative. If the action one seeks to deter is perceived to be the most viable (or least bad) option, an adversary will pursue that course and deterrence will fail.

A key facet of this effort is understanding the psychological and cultural aspects of decision making and how an adversary will evaluate available options. For example, loss avoidance—the idea that people are typically more averse to suffering a loss than they are attracted by the idea of making a gain of the same magnitude—can heavily influence decisions to attack or to accept the status quo. The particular circumstances of a terrestrial crisis are also vital to shaping these perceptions. The goal is to leave a potential adversary a viable and acceptable ladder that it can climb down during a crisis.

Next Steps

The tomes of literature on nuclear deterrence provide valuable lessons for improving our understanding of deterrence in space and the role of space in deterrence. The lessons and limits of this literature are a first step in developing a deterrence framework for space. The three elements of a deterrence framework—imposing costs, denying benefits, and encouraging restraint—do not have to be present in equal measure. By its nature, deterrence is adversary and context specific. Within the broad framework presented here, the United States must tailor specific approaches to specific potential adversaries in different scenarios. Some combination of these three elements will be required, and the elements must be applied within an overarching framework that is consistent to ensure credibility against multiple actors.

While many lament the US dependence on space, those capabilities provide an unparalleled ability to project power globally across all domains. To ensure the United States maintains the strategic advantage derived from those capabilities, it must develop a posture that not only deters counterspace operations but also ensures space instability does not collapse the threshold for deterrence failure during a broader terrestrial crisis. Such an approach offers the best chance to deter conflict and enhance

strategic stability while also providing national leaders with the ability to prevail in a conflict should space deterrence ultimately fail.

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Notes

1. *National Security Space Strategy—Unclassified Summary* (Washington: DoD, January 2011), http://www.defense.gov/home/features/2011/0111_nsss/docs/NationalSecuritySpaceStrategyUnclassifiedSummary_Jan2011.pdf.

2. See *Deterrence Operations Joint Operating Concept* (DO JOC) ver. 2.0 (Washington: DoD, December 2006), www.dtic.mil/futurejointwarfare/concepts/do_joc_v20.doc.

3. This point is made with exceptional clarity by Forrest E. Morgan, *Deterrence and First-Strike Stability in Space*, MG-916-AF (Santa Monica, CA: RAND, 2010), 17–21.